

# 1 Introduction

This chapter provides background information on Federal activities geared toward improvement of fish passage in the lower Snake River and the role of the Bureau of Reclamation (Reclamation) in the Lower Snake River Juvenile Salmon Migration Feasibility Study being conducted by the U.S. Army Corps of Engineer (Corps). It outlines the purpose, scope, and objective of this flow augmentation analysis.

## 1.1 U.S. Army Corps of Engineers Study

The Corps is conducting a Lower Snake River Juvenile Salmon Migration Feasibility Study; completion of a feasibility report and Environmental Impact Statement are anticipated for late 1999. That study focuses on alternative actions to improve migration conditions for anadromous fish in the lower Snake River. A notice of intent to develop an environmental impact statement (EIS) was issued by the Corps in the Federal Register on June 5, 1995.

### 1.1.1 Background and Need For Action

Congress passed the Pacific Northwest Electric Power Planning and Conservation Act (Public Law 96-501) in 1980. The act created the Northwest Power Planning Council (NPPC) and charged it, among other things, to develop a fish and wildlife program to protect and enhance fish and wildlife and to mitigate for losses due to hydroelectric project development and operations. The NPPC adopted its Fish and Wildlife Program in 1982. Federal, state, and local governments and agencies, Native American interests, and others have actively participated in periodic revisions of the NPPC's Columbia River Fish and Wildlife Program and efforts to enhance the anadromous fishery of the Columbia River system.

In 1990, several parties filed petitions with the National Marine Fisheries Service (NMFS) to list species of Snake River and Columbia River salmon as threatened or endangered under the Endangered Species Act (ESA). Senator Mark Hatfield of Oregon convened a regional "Salmon Summit" outside the formal ESA process to seek reversal of declines in the petitioned stocks. Although the Salmon Summit did not result in a regional plan to avoid listing of species, it did identify some desired actions. Among these was flow augmentation from Reclamation projects. Subsequently, the NPPC adopted certain priority projects in its Columbia River Basin Fish and Wildlife Program in 1991 and called on Reclamation to provide water for flow augmentation.

On November 20, 1991, the Snake River sockeye salmon (*Oncorhynchus nerka*) was listed as endangered, and, on April 22, 1992, the Snake River spring/summer and fall chinook (*O. tshawytscha*) salmon were listed as threatened. Although other aquatic species have been listed under the ESA, the driving force to provide flow augmentation has been the listed salmon.

The Corps, Reclamation, and the Bonneville Power Administration (BPA) joined in 1992 to begin consultations with the NMFS and the U.S. Fish and Wildlife Service (USFWS) to evaluate the operational effects of the Federal Columbia River Power System (FCRPS) on the listed species. The FCRPS consultation involved 14 Federal hydroelectric dams in the Columbia and Snake River basins operated and managed by the Corps and Reclamation; BPA was included in the consultation because it is the agency that markets the generated electricity. The three FCRPS agencies submitted biological assessments (BA) to NMFS and USFWS in 1993 and 1994. In legal challenges filed by the Idaho Department of Fish and Game (IDFG) and others, the U.S. District Court for Oregon ruled that NMFS' 1993 Biological Opinion (BIOP) was inadequate. The 1994 BIOP had been patterned

after the 1993 opinion, and a legal challenge appeared inevitable. To comply with the district court order, the plaintiffs and defendants to the suit agreed to develop a new multiyear BIOP, effective in 1995.

On March 2, 1995, the NMFS issued a BIOP on operation of the FCRPS with respect to endangered Snake River spring/summer chinook, Snake River fall chinook, and Snake River sockeye. This BIOP concluded that effects of the proposed operations of Federal hydroelectric dams in the Columbia and Snake River basins would jeopardize the continued existence of the listed Snake River salmon stocks. NMFS included a Reasonable and Prudent Alternative (RPA) in the 1995 BIOP which, if implemented by the three FCRPS operating agencies, would avoid further jeopardy to the salmon runs. The RPA called on Reclamation to annually provide 427,000 acre-feet of water from its Snake River basin reservoir storage system for flow augmentation to improve juvenile salmon survival during the downstream migration period. Reclamation formally accepted the RPA in its March 10, 1995, Record of Decision (ROD) and committed to provide flow augmentation from its reservoirs and private water rights in the basin above Lower Granite Lake.

Flow augmentation in the lower Snake River and the Columbia River is a key component of the 1995 BIOP and NPPC's Fish and Wildlife Program. The primary purpose of augmentation is to provide flows for juvenile salmon migration from April 10 through August. Salmon managers have set seasonal target flows at various sites. The targets can vary from year to year. The target at Lower Granite Lake is 85,000-100,000 cubic feet per second (cfs) from April 10 through June 20 and 50,000-55,000 cfs from June 21 through August 31.

Salmon managers can call for volumes of up to 1.2 MAF from Dworshak Dam (owned and operated by the Corps) on the North Fork Clearwater River and up to 237,000 acre-feet from Brownlee Reservoir (operated by the Idaho Power Company (IPC)) on the Snake River to meet target flows at Lower Granite Dam on the Snake River and McNary Dam on the lower Columbia River. In addition, up to 2,160,000 acre-feet from Grand Coulee, Libby, and Hungry Horse Dams in the upper Columbia River contribute to target flows at McNary Dam. An additional 1 million acre-feet (MAF) can also be released from Canadian storage water whenever the April-July forecast at The Dalles, Oregon, is less than 90 MAF.

Salmon managers also call for 427,000 acre-feet from Reclamation reservoirs to meet target flows at Lower Granite Dam. Reclamation began providing 427,000 acre-feet each year from the Snake River basin upstream from Brownlee Dam before the 1995 BIOP was issued and has provided that amount every year since 1993. This water was secured from Reclamation's uncontracted reservoir space, water rentals, and by permanent acquisition of reservoir storage space and natural flow rights.

### **1.1.2 Corps Request for Assistance**

One element included in several of the Corps alternatives for the future operation of the lower Snake River is flow augmentation using water supplies from the upper Snake River. Since Reclamation already provided some flow augmentation and is the primary Federal entity operating reservoirs in the upper Snake River, the Corps asked Reclamation for assistance in developing further information on flow augmentation.

The Corps asked Reclamation to analyze the impacts of providing additional flow using water from the upper Snake River at the following levels:

- Base Case/existing condition (providing 427,000 acre-feet/year)
- No flow augmentation
- Additional flow augmentation of 1 MAF (providing a total of 1,427,000 acre-feet/year)

The request included provisions for funding Reclamation to prepare a report on the results (Snake River Flow Augmentation Impact Analysis Report).

## **1.2 Reclamation Flow Augmentation Impact Analysis**

### **1.2.1 Scope**

The scope of Reclamation's analysis is based on an intergovernmental agreement between the Corps and Reclamation, which requests that Reclamation:

- Analyze specific levels of flow augmentation (none, 427,000 acre-feet, and 1,427,000 acre-feet) to help meet target flows at Lower Granite Lake,
- Identify the effects of implementing these scenarios, and
- Prepare this Snake River Flow Augmentation Impact Analysis that documents the findings of the analysis. Reclamation's report is to be of sufficient detail to provide supplemental information for decisions associated with the Corps' Lower Snake River Juvenile Salmon Migration Feasibility Study.

As the analysis progressed, it became obvious that providing 1,427,000 acre-feet from the upper Snake River could have dramatic effects on current water uses. Those effects could vary depending on the selection of water sources for flow augmentation. River and reservoir operations which could reduce impacts to one sector are likely to increase impacts to other sectors.

Reclamation faced several serious constraints in preparing this analysis. Time and data are the two major constraints. Given the time constraint, it would be impossible to go through a typical public review process that would identify acceptable levels of impacts to various water uses and to identify specific water sources for a flow augmentation of 1,427,000 acre-feet. Reclamation found it necessary to independently identify two scenarios for analysis. One scenario focuses on limiting impacts to irrigation and the other scenario focuses on limiting impacts to reservoir-based environmental and recreational opportunities. Reclamation also recognizes that in the event that an additional volume of flow augmentation from the upper Snake River is selected, future analysis will require intense public input to carefully identify specific water sources and site specific effects.

Data is the other constraint to analysis. Reclamation has collected and centralized a large amount of data on Reclamation reservoirs, the stream reaches downstream from those reservoirs, and lands irrigated with water supplied from Reclamation reservoirs. In contrast, data on other stream reaches, private storage facilities, and lands irrigated from natural flows or privately developed storage is scarce and widely scattered. To complete this analysis on flow augmentation in the timeframe required, Reclamation concentrated primarily on areas where Reclamation had already developed hydrologic and other data. This meant not only excluding privately developed reservoirs but also reservoirs developed by the Bureau of Indian Affairs (BIA).

The geographic scope of this analysis is the Snake River basin upstream of Lower Granite Lake, excluding the Clearwater drainage. The Clearwater was excluded from this analysis because Dworshak Dam and Reservoir, operated by the Corps, is the only major storage control in that drainage. Any analysis of Dworshak operations is the responsibility of the Corps. Two small reservoirs of the Lewiston Orchards Project (a Reclamation Project) and very limited private irrigation are too minor to have any measurable effect on the flow of the Clearwater.

Within this general geographic boundary, Reclamation's analysis is limited to the main stem Snake River and those subbasins that would provide flow augmentation water, whether from Reclamation reservoirs or acquisition of natural flow rights currently used for private irrigation operations. As a convenience in this analysis, Ririe Dam, a Corps facility operated by Reclamation, and Lucky Peak Dam, owned and operated by the Corps in the Boise River basin, are aggregated with Reclamation facilities and not separated out as Corps facilities. Reclamation markets the water in Lucky Peak Lake and its operation is fully integrated with the two upstream Reclamation reservoirs.

Reclamation developed and analyzed four scenarios for use by the Corps in its alternatives:

- Base Case: Provide 427,000 acre-feet of flow augmentation water each year (existing condition since 1993).
- No Augmentation: Provide no water for flow augmentation (condition prior to 1991).
- 1427i: Provide up to 1,427,000 acre-feet of flow augmentation water to meet deficits in flow targets at Lower Granite Dam. Irrigation shortages would be minimized by using large drawdowns of Reclamation reservoirs.
- 1427r: Provide up to 1,427,000 acre-feet of flow augmentation water to meet deficits in flow targets at Lower Granite Dam. Reservoir elevations would be maintained at or near the Base Case levels with shortages assumed by irrigation.

These four scenarios were evaluated using technical information developed through Reclamation's Snake River Resources Review (SR<sup>3</sup>). The SR<sup>3</sup> is developing improved tools for decisionmakers to use in considering competing or conflicting demands for operation of the Snake River system.

Hydrologic modeling and interpretation provide the basis for identifying potential effects on irrigation, fish, wildlife, water quality, hydroelectric generation, recreation, cultural resources, local and regional communities and economies, and Indian trust assets. Due to the limited time to conduct this analysis, it was not possible to address impacts to all potentially affected areas. Reclamation's technical staff selected representative focus reaches from those previously identified for SR<sup>3</sup> based on resource locations to assist in this programmatic level analysis. The focus reaches selected for this flow augmentation analysis may vary from resource to resource; however, most of the focus reaches are located between Jackson Lake Dam in Wyoming and Brownlee Dam in Idaho. The 12 focus reaches used in this analysis are listed in table 1-1.

<b>Table 1-1</b> Focus Reaches Identified for Flow Augmentation Analysis			
Major Reach		Extent	Reservoir
1	South Fork Snake River	Jackson Lake to Henrys Fork	Jackson Lake, Palisades
2	Henrys Fork	Henrys Lake to Snake River	Henrys Lake <sup>1</sup> , Island Park
3	Willow Creek	Ririe Lake to Snake River	Ririe Lake
4	Upper Snake River	Henrys Fork Confluence to Milner Dam	American Falls, Lake Walcott, Milner Lake <sup>2</sup>
5	Middle Snake River	Milner Dam to Brownlee Dam	C. J. Strike <sup>3</sup> Brownlee <sup>3</sup>
6	Boise River	South Fork and Main Stem Boise River— Anderson Ranch Reservoir to Snake River	Anderson Ranch Arrowrock Lucky Peak <sup>4</sup> Lake Lowell
7	Payette River	North Fork/Main Stem Payette and Deadwood Rivers—Cascade and Deadwood Reservoirs to Snake River	Cascade Deadwood Black Canyon <sup>2</sup>
8	Owyhee River	Lake Owyhee to Snake River	Lake Owyhee
9	SNAKE RIVER through HELLS CANYON complex	Brownlee Dam to Hells Canyon Dam	Oxbow <sup>3</sup> HELLS CANYON <sup>3</sup>
10	Lemhi River basin	Headwaters to the mouth at Salmon River	none
11	Salmon River basin	Headwaters to the mouth at Snake River	none
12	Grande Ronde River basin	Headwaters to the mouth at Snake River	none
<sup>1</sup> Henrys Lake is owned and operated by North Fork Reservoir Company <sup>2</sup> Not a storage facility <sup>3</sup> Brownlee is owned and operated by IPC <sup>4</sup> Lucky Peak Dam is owned and operated by the Corps; the powerplant is owned by four irrigation districts and operated by the city of Seattle; Reclamation markets storage in the reservoir. <sup>5</sup> Lower Granite Dam is owned and operated by the Corps.			

Reclamation is aware of many issues attached to the concept of flow augmentation; however, this analysis is limited to the scope of the intergovernmental agreement between the Corps and Reclamation. Issues considered outside the scope of this flow augmentation analysis include:

- Analysis of BIA and non-Federal storage facilities.
- Identification of specific, individual water sources for the 1, 427,000 acre-feet.
- Identification of other possible levels of flow augmentation.
- Identification of current water rights holders that would be willing to relinquish their rights for the sake of flow augmentation.
- Identification of potential new storage sites.
- Identification of potential mitigation measures.
- Identification of unavoidable and irreversible impacts.

- Whether flow augmentation is justified as a means to halt the decline or to recover endangered lower Snake River species.
- Policy decision about the appropriateness of reallocating supplies to flow augmentation.
- Make recommendations.

## **1.2.2 Objective**

This analysis identifies the capability of the Snake River basin to provide 1,427,000 acre-feet for flow augmentation in the lower Snake River. It is a programmatic analysis of the range and magnitude of impacts that can be expected from a decision to provide additional flow augmentation. Information contained in this document depicts representative – not specific – outcomes.

The scenarios presented in this document are intended to represent the kinds of actions that would be necessary and the resource commitments that could be required for flow augmentation. Therefore, the results of this study are not of sufficient detail to provide a complete analysis of impacts or specific reallocations of water to salmon flow augmentation. Impacts associated with reallocation of water would require separate site-specific analysis prior to actual acquisition. Both state and congressional action would be required prior to implementation of flow augmentation greater than 427,000 acre-feet.

## **1.3 Authorities**

The Corps is conducting its Lower Snake River Juvenile Fish Migration Feasibility Study/EIS under existing authority for projects on the lower Snake River (Rivers and Harbors Act of 1945, Public Law 79-14, dated March 2, 1945). Reclamation is providing information and evaluating potential flow augmentation components under the general authority of the Reclamation Act of 1902 as amended and supplemented.

## **1.4 Arrangement of Report**

Chapters 1-4 provide general background information, while chapters 5-8 discuss potential impacts. A short description of each chapter is given below:

Chapter 1 Introduction – Generally discusses the reasons Reclamation prepared this report on Snake River flow augmentation for the Corps.

Chapter 2 Background – Discusses the existing storage system developed by Reclamation and the Corps, groundwater interactions, and the general operation of the Snake River system upstream of Brownlee Dam.

Chapter 3 Water Sources For Flow Augmentation – Discusses the water sources Reclamation examined for potential use in providing additional downstream flow augmentation.

Chapter 4 Flow Augmentation Scenarios – Describes the four flow augmentation scenarios including the goals of each scenario.

Chapter 5 Hydrologic Analysis – Discusses the methods used for hydrologic modeling and the selection of water sources for each scenario and provides model findings on the success of each scenario in meeting flow augmentation goals, irrigation shortages that would be induced, and potential riverflow and reservoir content changes.

Chapter 6 Economic Analyses – Discusses national economic effects related to potential changes in irrigated agriculture, hydroelectric power generation, and recreation opportunities. Also discusses regional economic effects related to potential changes in irrigated agriculture and recreation opportunities with respect to jobs, sales, and regional income.

Chapter 7 Resource Analysis – Discusses the findings related to potential changes in water quality, fish, wildlife, vegetation, wetlands, threatened and endangered species, cultural resources, Indian trust assets, recreation, and Wild and Scenic rivers.

Chapter 8 Social Analysis – Discusses the general findings of potential effects on communities, families, and individuals along with concerns and views of water users and others.

Chapter 9 Implementation Issues and Concerns – Discusses potential methods of acquisition of water for flow augmentation against the background of state water law and other Federal actions.

Chapter 10 Consultation and Coordination – Discusses the background on consultation for this analysis and lists outreach activities.

Chapter 11 List of Preparers – List individuals and backgrounds of those involved in the technical analysis and preparation of this document.

Chapter 12 References – Lists documents cited and general references used in the preparation of this document; organized by chapter.

Attachments – Several attachments are included at the end of this report that provide some additional technical detail.

